Fire Program Analysis – Implementation

Modeling Large Airtankers

November 28, 2005

Topic: Modeling Large Airtankers for 2008 Budget Cycle

Task: Model Large Airtanker contribution to Initial Response per Fire Planning Unit (FPU). The FPA Steering Committee is directing the FPUs to model large airtankers to meet the intent of the Hubbard Report and the FPA Charter, i.e. model the contribution of existing and potential air tankers in the FPU analysis.

Purpose: To demonstrate the potential contribution or role that Large Airtankers provide specific to Initial Response to fires in individual FPUs.

What this will not do: Provide data needed to determine the number and or location of Large Airtankers.

Analyses Expectations: The Hubbard Report and the FPA Project Charter state that identifying the most cost effective fire management program is desirable. That desire can not be met if some fire resources are excluded from analysis. There is an expectation that analyses will consider all the fire resources that could contribute to containment of the fire events in the fire scenario. This includes fire resources that currently exist in the FPU, as well as fire resources that could potentially be deployed to the FPU (even if they are not in the current organization).

Process for Analyzing Large Airtankers in FPA-PM

Large Airtanker Analyses Objective: Demonstrate use of Large Airtankers for each FPU using the existing Large Airtanker Bases as found on the Forest Service website at *Base Information, Wildland Fire Chemicals: 2004 Information:* http://www.fs.fed.us/rm/fire/retardants/current/base.htm.

- For the budget analysis, ***Analysis: Parameters*** will be set to "*Analyze All Resources*" on the Fire Resources Included field.

FPU Inputs: Much of the input data needed to run an analysis has been extracted into Table 1 (Large Airtanker Base List). Standardized inputs will be used for the budget analyses performed by all FPUs.

If an airtanker base on the list is within 100 miles of any portion of an FMU it should be included for analysis.

Specific Steps:

1. Create a new participant on the ***FPU: Participant*** page. A Forest Service Regional Office and/or Bureau of Land Management State Office will need to be established as **non-budget participant** in the analysis if they own a base within 100 miles of any portion of an FMU within the FPU. Base owners are listed in Table 1. The Agency Budget field for these participants should be set to "No".

2. Create a new ***Dispatch Location*** defining each large airtanker base within 100 miles.
   - The Facility Owner should be defined based upon Table 1. For Forest Service, use a Regional Office; Bureau of Land Management, use a State Office; and for States, use the State within which the tanker base is located.
   - Fire Resource Owners will be either Forest Service or Bureau of Land Management units and match the facility owner.
   - Create ***Facility Capacity Type*** for a ***NonBudgeted-Airtanker Type 1 or Type 2*** (be sure to scroll down to the bottom of the pick list to find NonBudgeted-Airtanker Type 1 or NonBudgeted-Airtanker Type 2).

3. ***Associate*** the Airtanker Dispatch Location to all fire management units (FMUs) within the 100 mile radius of the base. It may be helpful to view the Aviation Base Map posted on the FPA website. The FPA website also provides a GIS coverage allowing queries to identify the FMUs within the 100 mile radius. Arc IMS coverage will also be available sometime in the future.

4. Since the aitrankers are being modeled as non-budgeted resources, the dispatch locations have their NonBudgeted facility capacity defined by inputting existing fire resources. Note: you do not create the facility capacity directly as you do with budgeted resources. You also do not define Extended Capacity for non-budgeted resources.

5. Define and input an ***Existing Fire Resource***, "Non-budgeted-Airtanker, Type 1-1" or "Non-budgeted-Airtanker, Type 2-1", for each pit shown on Table 1 for the Airtanker Base(s) in your analysis.
   - Budget Category will be set to "loaned", and
   - In Current Organization will be set to "No".
   -

   Note: The following format must be used when creating the Large Airtanker Existing Resources within FPA-PM. For the "**Local Identifier" field please use the two letter geographic area identifier followed by the Airport three letter code found on Table 1 below. The number of existing Large Airtankers for a specific base is defined under the Loading Pits column on Table 1. To identify each NonBudgeted Airtanker please use T1 for the first pit to define the first existing airtanker followed by T2 for the second tanker (pit) and so on until you have created an existing resource (Type 1 or Type 2 Airtanker) for each pit per base found on Table 1 in the Loading Pits column. Example: SWALMT1, SWALMT2, SWALMT1**

6. Use ***Constraints*** to define the periods when airtankers are unavailable in the analysis. Use local knowledge to establish when large airtankers have historically been available to the FPU. In FPA-PM select > Enter Data > FMU, select an applicable FMU, select Constraints > Create then define the time periods when air tankers will be *unavailable* to the analysis. For example; if air tankers are typically available sensitivity period 12 to period 21 (June 4 to October 21) you must create two constraints, one that covers the time period before period 12 (i.e. 1-11). A second constraint would cover period 22 through period 26.

- **NOTE: Using the Constraint "No Fixed Wing Airtankers" will result in NO airtankers being deployed within the model. This includes Type 1, Type 2, Type 3 and Type 4 (SEATS), for the time period of the Constraint.**

Dispatch Locations defined for large airtankers can also have Facility Capacity defined for SEATs, if the SEAT is also owned by a non-budgeted partner. SEATs owned by budgeted partners require the creation of a dispatch location with a budgeted participant as the owner.

Observations from testing: Numerous analyses were performed using the Central Oregon Prototype dataset. Two airtanker bases, Redmond and Klamath Falls, were analyzed and the airtanker quantity was also varied.

- Large airtankers are often not deployed at lower cost limits.
- A single airtanker was deployed to 38 fire events in one analysis; this is well within our expectations as a model output.
- The model does appear to be responding correctly if one airtanker base is a greater distance from the FPU workload.
- An airtanker constraint was applied so that airtankers were available for periods 12 to 21 (this is the best fit for Central Oregon if both air tanker bases are analyzed).
- Applying a constraint on airtankers did effectively reduce their contribution to the containment of fire events.
- The lower cost type 2 airtanker was deployed to the modeled fire events before the more costly type 1 airtanker in most test analyses.
- Where more than one large airtanker was modeled (multiple dispatch locations), generally only one large airtanker was used in the optimal solution. Having more than one large airtanker in the optimal solution is certainly possible, and was observed in some of the test analyses.

Sub Issues: The FPUs have asked a number of pertinent questions, and have many justifiable concerns.

- *Each designated base has the potential to provide service to one or many FPUs.* A single airtanker could be part of the optimal solution for many FPUs. This is okay, but should be a footnote in the FPU documentation.
- *What if my analysis shows heavy use of national heavy airtankers, and less need for FPU fire resources?* This is possible, but testing did not show local FPU fire resources being replaced by national large airtankers.

Table 1: Large Airtanker Base List with key FPA input data

Geographic Area	Base Name	State	Airport	Latitude	Longitude	Loading Pits	Owner Agency
SW	Alamogordo	NM	ALM	32 50.4N	105 59.4W	3	USFS
SW	Albuquerque	NM	ABQ	35 02.5N	106 36.5W	2	USFS
SW	Fort Huachuca	AZ	FHU	31 35.3N	110 20.6W	3	USFS
SW	Williams/Gateway	AZ	IWA	33 18.5N	111 39.3W	2	USFS
SW	Prescott	AZ	PRC	34 39.1N	112 25.2W	2	USFS
SW	Roswell	NM	ROW	33 18.0N	104 31.8W	1	BLM
SW	Silver City	NM	SVC	32 38.2N	108 9.4W	2	USFS
SW	Winslow	AZ.	INW	35 01N	110 43.4W	3	USFS
SA	Fort Smith ATB	AS	FSM	35 20.2N	94 22.1W	1	USFS
SA	Lake City ATB	FL	LCQ	30 11.0N	82 34.8W	1	USFS
SA	Knoxville ATB	TN	Knoxville	35 48.7N	83 59.1W	2	USFS
RM	Denver(JEFCO)	CO	BJC	39 53.5N	105 07.0W	1	USFS
RM	Durango	CO	DRO	37 09.09N	107 45.22W	1	USFS
R M	Grand Junction	CO	GJT	39 07.3N	108 31.5W	2	BLM
RM	Greybull	WY	GEY	44 30.5N	108 04.5W	2	BLM
RM	Rapid City	SD	RAP	44 02.7N	103 03.4W	1	USFS
PN	Kingsley ATB	OR	LMT	42 09.3N	121 43.9W	3	USFS
PN	La Grande ATB	OR	LGD	45 17.4N	118.00.3W	3	USFS
PN	Medford ATB	OR	MFR	42 22.4N	122 52.3W	2	USFS
PN	Moses Lake ATB	WA	MWH	47 12.3N	119 19.1W	4	USFS
PN	Troutdale ATB	OR	TTD	45 33.0N	122 24.0W	2	USFS
PN	Redmond ATB	OR	RDM	44 15.3N	121 08.9W	3	USFS
NR	Billings	MT	BIL	45 48.4N	108 32.4W	2	BLM
NR	Coeur d' Alene	ID	COE	47 46.5N	116 49.1W	2	USFS
NR	Helena AAB	MT	HLN	46 36.4N	111 58.9W	2	USFS
NR	Kalispell	MT	FCA	48 18.7N	114 15.2W	1	USFS
NR	Missoula	MT	MSO	46 54.9N	114 05.3W	2	USFS
NR	West Yellowstone	MT	WYS	44 41.3N	111 07.0W	1	USFS
GB	Battle Mountain	NV	BAM	40 35.9N	116 52.4W	2	BLM
GB	Boise	ID	BOI	43 33.9N	116 13.4W	3	USFS
GB	Cedar City	UT	CDC	37 42.1N	113 05.8W	3	BLM
GB	McCall	ID	MYL	44 53.4N	116 06.0W	2	USFS
GB	Minden ATB	NV	MEV	39 00.0N	119 45.1W	2	BLM/USFS
GB	Pocatello	ID	PIH	42 54.8N	112 35.6W	2	BLM
GB	Stead/Reno	NV	4SD	39 40.0N	119 52.4W	2	BLM/STATE
GB	Hill Tanker Base	UT	OGD	41 07.4N	111 58.3W	2	USFS
EA	Bemidji	MN	BJI	47 30.6N	94 56.0W	2	STATE/BIA
EA	Brainard	MN	BRD	46 23.9N	94 08.2W	2	STATE
EA	Ely	MN	ELO	47 49.5N	91 49.8W	2	USFS
EA	Hibbing	MN	HIB	47 23.2N	92 50.3W	1	STATE
CA	Bishop	CA	BIH	37 22.7N	118 21.7W	1	USFS
CA	Chester AAB	CA	O05	40 17.3N	121 14.3W	3	USFS

Geographic Area	Base Name	State	Airport	Latitude	Longitude	Loading Pits	Owner Agency
CA	Chico AAB	CA	CIC	39 47.7N	121 51.4W	3	STATE
CA	Fresno AAB	CA	FAT	36 46.5N	119.43.0W	4	USFS/STATE
CA	Lancaster	CA	WJF	34 44.4N	118 13.0W	4	USFS
CA	Siskiyou County	CA	SIY	41 46.9N	122 28.0W	2	USFS
CA	Porterville	CA	PTV	36 01.8N	119 03.7W	4	USFS/STATE
CA	Redding	CA	RDD	40 30.5N	122 17.5W	4	USFS/STATE
CA	Santa Barbara	CA	SBA	34 25.6N	119 52.4W	2	USFS
CA	Stockton Air Base	CA	SCK	37 53.7N	121 14.2W	3	USFS
CA	San Bernardino	CA	SBD	34 05 43	117 14 55	3	USFS
AK	Wainwright (FBK)	AK	FBK	64 50.2N	147 36.9W	3	BLM
AK	Galena (GAL)	AK	GAL	64 44.2N	156.56.2W	3	BLM
AK	McGrath MCG)	AK	MCG	62 57.2N	155 16.4W	2	STATE
AK	Palmer (PAQ)	AK	PAQ	61 35.7N	149 05.5W	2	STATE
AK	Tanacross (TSG)	AK	TSG	63 22.5N	143 20.0W	3	STATE
AK	Kenai (ENA)	AK	ENA	60 34.4N	151 14.7W	1	STATE
AK	Homer	AK	HOM	59 38 44	151 28 35.70	1	STATE
AK	Delta	AK	BIG	63 59.4	145 43.17	1	STATE